DigiSET – The Academy of Digitally Sustainable European Teacher

Project Number: 101249272

ERASMUS-EDU-2025-PEX-TEACH-ACA

WP2 – COUNTRY REPORT

AUSTRIA

Teacher Competences for Sustainable Digital Literacy:
National Context, Policies, and Professional Development

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Date: 30.04.2026

Version: 1.0

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Funding

Funded by the European Union. Views and opinions expressed are, however, those of the author(s) only and do not necessarily reflect those of the European Union or EACEA. Neither the European Union nor the granting authority can be held responsible for them

Project contribution to Agenda 2030

Acknowledgment

This report is a deliverable of the project 'DigiSET - The Academy of Digitally Sustainable European Teacher', funded within the Erasmus+ Programme with applicant Universität für Weiterbildung Krems and Grant Agreement No. 101249272

Disclaimer on AI usage

Based on Academic Integrity and Transparency in AI-assisted Research and Specification Framework (Bozkurt, 2024), the authors of this paper acknowledge that the paper was drafted with the assistance of Lumo and DeepL (Versions as of April 2026), complementing the human editorial process. The human authors critically assessed and validated the content to maintain academic rigor. The authors also assessed and addressed potential biases inherent in the AI-generated content. The final version of the paper is the sole responsibility of the human authors.
Reference: Bozkurt, A. (2024). GenAI et al.: Cocreation, Authorship, Ownership, Academic Ethics and Integrity in a Time of Generative AI. Open Praxis, 16(1), 1-10. https://doi.org/10.55982/openpraxis.16.1.654

Recommended Citation

Schön, S., Brünner, B., Ebner, M., Keser Aschenberger, F., Aral, N. & Aydin, D. (2026). Teacher Competences for Sustainable Digital Literacy. WP 2: Country Report Austria. April 2026. DigiSET project. Graz University of Technology. DOI: 10.3217/5rybf-96s62

Content

Abbreviations

AI – Artificial Intelligence
CPD – Continuous Professional Development
ITE – Initial Teacher Education
MOOC – Massive Open Online Course
OER – Open Educational Resources
ESD – Education for Sustainable Development

1. National Policy Framework for Digital and Sustainable Education

1.1 Digital Education Strategy and Teacher Competences

The current strategy of the Austrian government and the Austrian Federal Ministry address digital education and related teacher competences in several ways in the last years.

Digitalization and the development of digital competencies represent a central priority in Austria's current government program[1]. Generally, digital competences are highlighted as relevant measure for all (see Bundeskanzleramt, 2025, p. 198). Currently, a report of the Federal Chancellery Republic of Austria (2025, 13) reports that the Austrian current national value of basic digital skills is of 64,7% and should raise to 80% till 2030, in EU target value 2030, coherent to EU policy. To achieve this KPI, Austria consolidated efforts to enhance digital skills and established, for the first time, a comprehensive stakeholder initiative supported by four ministries. The 'Digital Skills Austria' strategy was developed through a nationwide dialogue process, identifying 350 specific measures. Building on this foundation, eight strategic priorities were defined, each accompanied by a corresponding competence package (see Federal Chancellery Republic of Austria, 2025 p. 107), e.g. the Austrian adaptation of the European *DigComp* (2022) framework *DigComp 2.3* AT (Nárosy, Schmölz, Proinger & Domany-Funtan, 2022).

Concerning schools, two key strategic developments have shaped this transformation in recent years. First, the Austrian competence framework for digital competences of educators, the *digi.kompP* framework has been systematically implemented to address previously identified gaps in educators' digital competencies. This model outlines eight key competence areas—including digital identity, information literacy, communication, content creation, safety, and problem-solving—mapped across eight proficiency levels and is now embedded in teacher education curricula (Brandhofer & Miglbauer 2020). An updated version was announced in April 2026, including now AI and elementary pedagogy (Brandhofer et al., 2026).

Second, the mandatory school subject "Digitale Grundbildung" (Digital Basic Education) was introduced in 2018 and became fully integrated into regular timetables from the 2022/2023 school year for grades 5-8, ensuring all students acquire core competencies in media literacy, data protection, and information processing (BMB, 2026a; Hörmann, Schmidthaler & Sabitzer, 2023). This curricular reform has been accompanied by nationwide hardware distribution initiatives, with tablets and laptops provided to lower-secondary schools as part of the "Digital Learning" device initiative, creating the infrastructure necessary for practical digital skill development (BMB, 2026b). Together, these measures establish a comprehensive framework linking teacher competency development, student curriculum, and technological infrastructure to prepare Austrian education for the digital age.

In general, it should be noted here that the Austrian ministry's "Education Package" outlines a strategy for systematically integrating objectives such as digital education with other objectives, like sustainable education: "Subject-specific and cross-curricular skills are equally important for pupils. In addition to acquiring basic subject-specific skills, the development of personal and social skills is therefore given greater priority. 21st-century skills are being strengthened: communication, cooperation, creativity and critical thinking are coming into sharper focus, as are digital literacy, environmental education and sustainability" (translated from the German original, BMB, 2026d). Accordingly, all curricula must be revised to incorporate overarching themes, namely Educational, Career and Life Orientation, Entrepreneurship Education, Health Promotion, Civic Education, Reflective Gender

[1] Please note: The English versions of the current Ministry Webpages are outdated resp. not updated (it refers to the old name of the ministry and old strategies, 2026-02-19)

Pedagogy and Equality, Linguistic Education and Reading, Environmental Education for Sustainable Development, Traffic and Mobility Education, and Economic, Financial and Consumer Education.

While conceptual frameworks, particularly the digital competence framework for teachers *digi.kompP*, provide the necessary theoretical foundation, they would likely remain ineffective in isolation without the accompanying operational infrastructure. This infrastructure is consolidated under the *eEducation Austria* portal, which serves as the central umbrella platform for initiatives aimed at embedding digital and informatics competencies across all Austrian school levels—from primary education to the final secondary exams. By integrating existing networks such as eLSA, eLC, and IT@VS under a unified brand, *eEducation Austria* facilitates a structured ecosystem where 'eEducation Expert Schools' disseminate best practices to less experienced institutions. Crucially, all activities are systematically aligned with the *digi.kompP* competency levels for pupils and teachers (digi.komp 4, 8, 12/13, and P), ensuring that teacher development, student assessment (via digi.check), and curriculum materials are not merely theoretical constructs but are implemented through a cohesive strategy for school development, stakeholder networking, and resource creation. (see eEducation description at Bildungsdirektion Salzburg, 2026).

At present, there is an active policy debate in Austria regarding the introduction of computer science as a mandatory subject at the upper secondary level (AHS), with a newly established curriculum team working on a revised combined 'Media and Informatics' curriculum since mid-2025, though this proposal remains under discussion and has not yet been formally implemented (Der Standard 2025a, Der Standard 2025b).

1.2 Sustainability in Education Policy

Education for Sustainable Development (ESD) has been a central component of Austrian educational policy since the early 2000s (see BMB, 2026c; Heinrich et al., 2007), anchored by the establishment of the ÖKOLOG network in 1999. The ÖKOLOG programme is the Austrian initiative that supports the implementation of sustainability in schools, and is the oldest network supported by the Ministry of Education (see Rauch & Pfaffenwimmer, 2020, chapter 6). The largest Austrian network for sustainable education, involves around 750 schools and 14 teacher training institutions (Oekolog.at, 2026). The programme promotes the integration of sustainability into school development, teaching practices and everyday school life. This includes areas such as resource management, consumption and interdisciplinary learning. Initiated by the Federal Ministry of Education, the programme supports teachers and school leaders in implementing Education for Sustainable Development (ESD) (Ökolog, 2026a). Funding mechanisms such as the Educational Funding Fund for Sustainable Development offer financial support for school initiatives related to sustainability and the UN Sustainable Development Goals, providing project-based funding of between EUR 300 and 1,300 (Ökolog, 2026b).

Further platforms can also be given as examples for Austria:

The Austrian Bildung2030 (2026) platform provides access to courses on Global Learning, Global Citizenship Education, and Education for Sustainable Development throughout Austria. These programmes are often delivered in cooperation with educational institutions such as pedagogical universities and universities. They target educators across all educational sectors, as well as multipliers engaged with the Sustainable Development Goals. As one example for teacher education, it should be mentioned that the University of Klagenfurt's four-semester in-service course 'Innovation in Teacher Education – Education for Sustainable Development' (BNE in German) has been delivered successfully four times since 2006, with the fifth course commencing in 2019 (our research indicates this represents the most recent confirmed offering of the programme) (Rauch & Pfaffenwimmer, 2020). Bildung2030 also covers opportunities and networks for school development and good practices.

Umweltbildung.at is the Austrian portal for education designers, operated by the Federal Ministry for Agriculture, Forestry, Climate Protection, Environment, Regions and Water Management and the Federal Ministry of Education. It awards the “Sustainability Award” to Austrian educational institutions and also provides teaching ideas.

ESD is recognized as a significant topic and is referenced on the ministry website. The BMB ambitions are to integrate topics such as digital skills and sustainability education (BMB, 2026d). And ESD is mentioned in the newly adapted *digi.kompP* framework (see 2.1). One result is that Sustainable Development is addressed in Austrian education policy through the school subject of Digital Basic Education as well: The curriculum explicitly links digital education with interdisciplinary themes, such as ESD (see 1.1).

Noticeable, a consortium of Austrian universities - the 'Alliance of Sustainable Universities in Austria' - has developed a two-semester 'Education for Sustainable Development Certificate’ program specifically for university lecturers. This programme provides higher education educators with the competencies and tools needed to embed sustainability concepts across their teaching and curricula (Hübner et al., 2020; Risopoulos-Pichler et al., 2022).

1.3 AI in Education Policy

In the subject curricula (Digital Basic Education, Computer Science), engagement with AI is explicitly recommended, while in the overarching themes 'Informatics Education' and 'Media Education' it is implicitly recommended. It is supported through digital learning materials (e.g. Eduthek) and school initiatives (BMB, 2026e). Since April 2026, AI competences and as well ethical questions are addressed in the Austrian teachers’ digital teaching competence framework *digi.kompP* (Brandhofer et al., 2026).

Artificial intelligence is addressed in Austrian education policy through the school subject of Digital Basic Education; this applies to both lower secondary AHS and New Middle Schools. (Bundesgesetzblatt, 2022). The following learning objectives are explicitly named in the curriculum: to describe how artificial intelligence controls many software and physical systems (Grade 3), and (T) to reflect on the limitations and possibilities of artificial intelligence (Grade 4). Additionally, AI is part of the curriculum for Computer Science classes, which (currently) is not mandatory.

All new curricula for teacher education programs are subject to review and approval by a Quality Assurance Council (QSR, 2024). In accordance with regulations set by the ministry, this council specifically evaluates since 2024 whether the three designated priority areas—Artificial Intelligence, Media Literacy, and Digitalization & Globalization—have been effectively integrated into the curriculum. The Council assesses not only the inclusion of these topics but also verifies that they are implemented with the requisite depth and pedagogical focus mandated by the ministry.

Teachers' competences are addressed through training and professional development opportunities, including seminars, webinars and a national AI MOOC covering topics such as AI basics, classroom use, ethics and data protection (BMB 2026e). And practical implementation is supported through pilot projects and good practice collections, which provide guidance on the pedagogical use of AI tools in schools. AI-focused school development initiatives include AI badges and strengthened teacher training in cooperation with the *eEducation* network (eEducation, 2026).

In addition to the initiatives listed on the ministry (BMB) website, there are other relevant resources available. So, another openly licensed MOOC for teachers using the UNESCO (2024a) is available for Austrian teachers (see chapter 5). Additionally, the OER platform *Prompting.schule* from TU Graz offers free courses for students focusing on AI literacy and the responsible use of AI technologies, as well as prompt engineering skills, based on the UNESCO (2024b) AI competency framework for students. These courses support learners in becoming critical and active users of AI technologies with hands-on activities (Prompting.schule, 2026; see chapter 5).

1.4. Open Educational Resources (OER) in Education Policy

Austria has a comparatively long-standing engagement with Open Educational Resources (OER), particularly, though not exclusively, in the higher education sector (Schön & Ebner, 2020; Neumann et al., 2022). OER is designated as one of the focus themes in Austria's national Open Science Policy (established February 2022, Neumann et al., 2022). Since 2022, an Austrian university certification scheme has been in place: to date, five higher education institutions have qualified as "Certified OER Higher Institutions," and by April 2026 more than 300 individuals have received the "OER Practitioner" certificate (Schön et al., 2023, OER-zertifikat.at, 2026a). Nine Austrian universities and higher education institutions maintain OER repositories (see OER-zertifikat.at, 2026b). The national Austrian MOOC platform *iMooX.at* offers exclusively online courses with Creative Commons licenses.

In the school context, OER initiatives have also existed for some time. A notable milestone was a feasibility study on OER textbooks conducted in 2017, which outlined six scenarios for implementation (Schön et al., 2017). OER usage and development are also referenced in Austria's digital competence framework for teachers (digi.kompP; Brandhofer & Miglbauer, 2020), which explicitly incorporates requirements for creating, adapting, and publishing digital content using open licenses.

Several projects and initiatives publish Open Educational Resources (OER) for the school sector. Nevertheless, the use of open licenses for educational materials is not compulsory, resulting in continued publication of educational resources without open licensing—including materials commissioned directly by the Ministry. Furthermore, a comprehensive search mechanism for openly licensed educational resources in the school sector is currently lacking. The platform for school material *eduthek.at* (BMB, 2026f) also added a possibility to directly search for open licensed materials (see Figure 1). Teachers are asked to submit their own material, preferably under open license, explicitly mentioned are CC BY 4.0 or CC BY-SA 4.0 (BMB, 2026j).

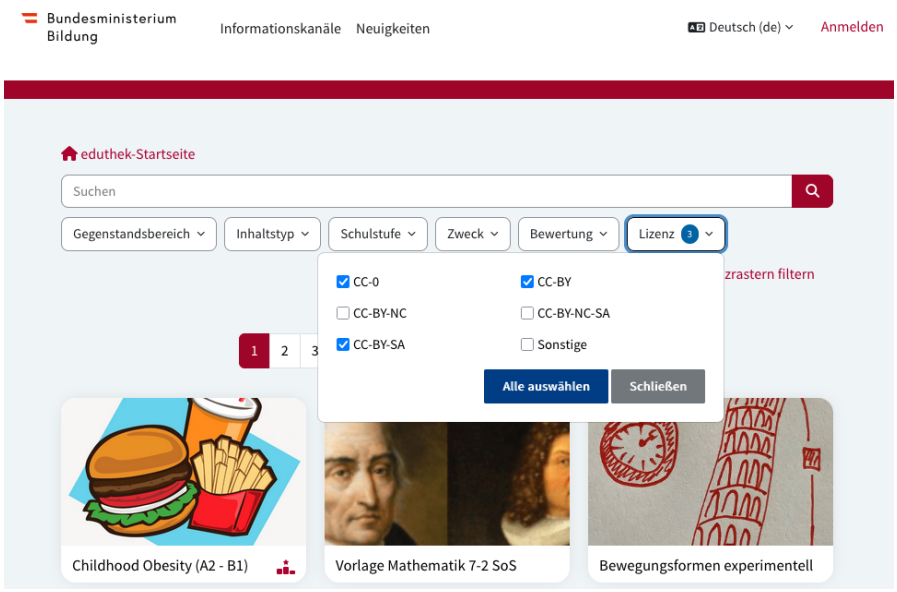

Figure 1: Screenshot and logo of the eduthek.at and its opportunity to filter for Creative Commons license. Source: https://www.bildung.gv.at/filter/eduthek/search.php?licenses=cc-0%2Ccc-by%2Ccc-by-sa (2026-04-27)

Notably, the Austrian ESD certificate for higher education includes OER in both the basic module and as an advanced specialization option (Ebner et al., 2026; Risopoulos-Pichler et al., 2022).

1.5 Gap Analysis: Sustainable Digital Literacy

For the Austrian Ministry of Education, both sustainable development and digital competencies are central strategies for Austrian school instruction. In implementation, attention is paid to ensuring that the topic of sustainable development—as well as several other cross-cutting themes such as Entrepreneurship Education—must be incorporated and considered in all curriculum revisions (see 1.2). This is also the case for the school subject “Digital Basic Education” and for the development of curricula for Austrian teacher education.

When designing these curricula, it is explicitly noted that sustainability must be addressed, and evidence must be given for this. This does not necessarily mean that the cross-cutting themes play a major role in the actual implementation of teacher education; however, their integration is at least required and should be demonstrable.

Regarding the term 'sustainable digital literacy,' there is no explicit mention of such an integrative concept in Austria's national educational guidelines. But, as shown in the following chapter 2, ESD is directly mentioned in the *digi.kompP* framework for digital teaching competencies of teachers.

And additionally, there seems to be interconnection of the topics and communities:

As an example, at the Website of the ‘virtual PH” (“virtuelle PH”; the Austrian online teachers academy, responsible for digital teaching related further education of teachers), digital teaching is open to sustainability topics: A dedicated headline for “digital teaching for a sustainable future” (own translation), i.e. sustainable education news exists. Therefore, there is also an own form to submit entries for this topic (see Figure 2).

Figure 2: Screenshot and logo of the “Digital bilden nachhaltige Zukunft” [Digital Teaching – sustainable future] Webpage of virtuelle PH (left) and its logo (right).
Source: https://www.virtuelle-ph.at/lernideen-redesign/ (2026-04-27)

Looking at the homepage of Umweltbildung.at, the Austrian forum for sustainable development, one of the next events is about the topic on misinformation and fake news at the Internet by an expert from the saferinternet.at group (see Figure 3).

Figure 3: Screenshot of the Website umweltbildung.at, an ESD initiative, offering an online presentation about (online) disinformation concerning sustainability and climate topics. Source: https://events.umweltbildung.at/event/desinformation-erkennen/ (2026-04-27)

In Austria, digital education and ESD seems to represent distinct communities. But some reciprocal openness is observable: ESD actors demonstrate receptiveness to digital pedagogies, while advocates of digital teaching show increasing engagement with sustainability issues. However, despite this convergence of interests, there is currently no major, dedicated strategic initiative explicitly focused on the intersection of digital and sustainable teaching.´

2. Teacher competence frameworks in use

2.1 National teacher competence standards

Starting with the 2024–25 school year, a detailed job description for teachers (“Berufsbild für Lehrerinnen und Lehrer”) was established for the first time and incorporated into the State Curriculum Framework in May 2025 (BMB, 2025). This description identifies the following core competency areas: subject-specific and pedagogical knowledge; teaching and learning competencies; digital and inclusive teaching methods; professional reflection; and lifelong learning.

Additionally, several competency frameworks for teachers are available in Austria:

First, there is a framework for teacher competencies in *sustainable development* known as the *Competency Compass* (BMBWF, 2022). It is specifically designed for educators. It builds upon the 'Environmental Education for Sustainable Development' directive (BMBF, 2014) and many related initiatives and projects in the field of Education for sustainable development (ESD). It serves as a self-assessment and orientation tool, enabling teachers to identify and reflect on their acquired competencies in ESD and environmental education. It helps to recognize strengths and identify areas for further development.

When it comes to digital competencies for educators, the *digi.kompP* framework is the Austrian standard. The *digi.kompP* framework was developed in Austria by the University College of Virtual Teacher Education, commissioned by the Federal Ministry of Education and Women's Issues. Developed in 2016, the model was specifically designed to address the Austrian education system and the varying stages of digital competence development among teachers—gaps that existing international models failed to adequately cover. To

ensure international alignment, the developers studied various European and global digital competence frameworks, particularly drawing on the EU Commission's *DigComp* framework (Ferrari, 2013), which outlines eight core competences for lifelong learning. *DigComp* served as a reference point for ensuring the completeness and consistency of *digi.kompP* during its ongoing development process. (Brandhofer & Miglbauer, 2020)

So, digital teacher competences are defined through the *digi.kompP* framework, which outlines a comprehensive model for educators' digital skills across teaching, learning, and professional development. In there, digital competences are structured across multiple domains, including technical knowledge (informatics systems), pedagogical application (digital teaching and learning), creation of digital materials, and professional collaboration and development. The model follows a progression structure (from basic to advanced levels) and integrates digital competences into all areas of teaching practice, including subject-specific pedagogy and school development. The framework also includes aspects such as ethics, data protection, media literacy, OER, ESD and societal impacts of digital technologies. (BMB, 2026g; Brandhofer et al., 2020, Brandhofer & Miglbauer, 2020).

In April 2026, a new version of the Austrian framework *digi.kompP* was published (Brandhofer et al., 2026[2]). In terms of content, particular emphasis was placed on the integration of AI literacy, the systematic inclusion of early childhood education, and aspects of digital well-being. To ensure currency and relevance, the authors drew on frameworks including the framework 'Technological Pedagogical Content Knowledge' (TPACK) by Koehler & Mishra (2006), *DigCompEdu* (Redecker, 2017), and the Sustainable Development Goals (United Nations, 2015; see Brandhofer et al. 2026, p. IV).

Notably, concerning DigiSET's perspective, the *digi.kompP* framework does address OER and AI intensively.

The *digi.kompP* competency framework explicitly refers to OER since 2021 on several occasions, including in Category C, "Creating Digital Materials" (see Figure 4). In details, OER is for example mentioned as criterion C.9 (digi.kompP 2026; own translation):

- C.9.1. I can find materials licensed as Open Educational Resources.
- C.9.2. I can use materials licensed as Open Educational Resources in a manner that complies with the law.
- C.9.3. I can check whether materials licensed as Open Educational Resources meet the specified licence conditions.
- C.9.4 I can licence my materials as Open Educational Resources accordingly and make them available to other teachers.

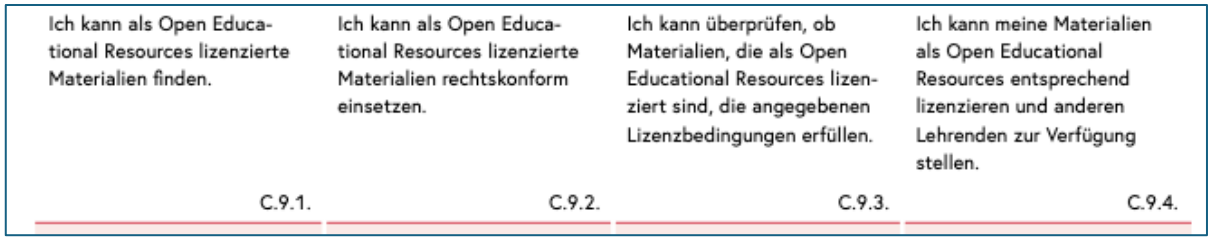

Figure 4: Screenshot taken from the category C "Producing digital materials" of the Austrian teacher competence framework for digital competencies, highlighting (exemplarily) the relevance of Open Educational Resources. Source: digi.kompP 2026, Category C). *Note: We made a screenshot of a preliminary copy that we got by the authors, see Brandhofer et al., 2026.*

[2] Please note that while the article by Brandhofer et al. (2026) has been published as this report was finalised, the referenced framework has not yet been formally released. All citations pertaining to the framework are based on a pre-publication version kindly shared with us directly by the authors.

Since the latest update in April 2026, now AI plays more explicit role in the framework, specifically in the criterion E8.1 (digi.kompP 2026, own translation):

- E.8.1. I can identify the potential of artificial intelligence (AI) in the subject.
- E.8.2. I can utilise the potential of artificial intelligence (AI) in the subject.
- E.8.3. I can reflect on the potential of artificial intelligence (AI) in the subject.
- E.8.4. I can harness the potential of artificial intelligence (AI) in the subject within co-creative learning spaces and processes.

Notably, also DigiSET topics ESD and inclusion are directly addressed within the digital teaching framework for teachers *digi.kompP*:

ESD development is directly named in category B “digital living”, criterion B.2 (digi.kompP 2026, own translation):

- B.2.1. I can describe the interactions between technology and society
- B.2.2. I can utilise the opportunities for sustainable education arising from the interactions between technology and society.
- B.2.3. I can evaluate the opportunities for sustainable education arising from the interactions between technology and society for my teaching practice.
- B.2.4. I can help shape future opportunities for sustainable education arising from the interactions between technology and society.

Ethical challenges are addressed generally in criterion B.11 (digi.kompP 2026, own translation):

- B.11.1. I can describe ethical challenges associated with the use of digital technologies.
- B.11.2. I can take ethical standards into account when using digital technologies in everyday educational practice.
- B.11.3. I recognise the societal impacts of digital technologies and can adopt a reasoned stance on issues of technology ethics.
- B.11.4. I can encourage learners to evaluate and shape digital processes and content ethically.

Accessibility, especially to media, is directly addressed within at least two criteria, so accessibility generally (B12, digi.kompP 2026, own translation):

- B.12.1. I can identify the importance of media accessibility for the knowledge society.
- B.12.2. I can illustrate the importance of media accessibility for the knowledge society using examples.
- B.12.3. I can assess the importance of media accessibility for the knowledge society.
- B.12.4. I can actively contribute to raising awareness of digital media accessibility for the knowledge society.

Accessibility and inclusion are seen as well important for Category C about Creating Digital Materials (digi.kompP 2026, own translation):

- C.7.1. I can explain the importance of accessibility for digital teaching materials.
- C.7.2. I can illustrate the importance of accessibility for digital teaching materials using examples.

- C.7.3. I can reflect on current trends and the legal framework regarding the accessible design of digital
- materials.
- C.7.4. I can adapt my teaching practice to reflect the importance of media accessibility for digital teaching and learning materials and for inclusive learning processes.

In summary, Austria possesses distinct models for both ESD and digital teaching competencies, with the current digital teaching competency framework *digi.kompP* explicitly addressing ESD and already encompassing many of the DigiSET themes.

2.2 Adoption of European frameworks

Austria has customized the EU's *DigComp* framework by creating a national version called *DigComp* 2.3 AT. While this builds upon the EU's *DigComp* 2.2 model, it includes one additional competence area titled "(0) Foundations, Access and Digital Understanding." The framework serves as a reference tool for developing education policies, training programs, and related initiatives across Austria. At the national level, it is applied and tailored to local needs, though available sources do not indicate that adoption is compulsory. Rather, it functions as an organized reference model intended to guide curriculum design, professional training, and certification processes (Digital Austria, 2026).

Austria took its own path with the teacher digital competency framework: The *digi.kompP* (2021) framework is a nationally adapted model that was initiated in 2016, as there were (at that time) no suitable international models available—the EU model *DigCompEdu* framework was only published in 2017. During subsequent revisions, the Austrian framework aligned itself with the European model, but the Austrian model was not replaced and just updated in 2026 (Brandhofer et al., 2026). One notable difference is that AI, Education for Sustainable Development (ESD) and Open Educational Resources (OER) were and are mentioned specifically and frequently in *digi.kompP* 2020 and 2026 compared to the EU framework.

Regarding the *GreenComp* framework, our research found evidence that it is systematically integrated into Austrian education system. So, there are indications of Austrian universities participating in several European projects on this topic (see Javorka et al., 2024). Even more important, the publication “Competencies of Educators in Environmental Education for Sustainable Development” of the former Federal Ministry of Education (then BMBWF, 2022) directly mentioned as reference the *GreenComp* (2022) framework. However, there is presumably no direct adoption or coherence, given that the development of ESD in Austria already has a significantly longer history—for example, university programs were introduced in the early 2000s (see 1.2), and competencies were explicitly addressed as early as 10 years ago (see Rauch & Steiner, 2013). We did not find a specific statement on this in our research.

LifeComp (2016) is mentioned in several Austrian publications and used as reference to add additional personal competences. For example. the Austrian *DigComp* 2.3 AT framework (Nárosy et al., 2022) refers to *LifeComp* – and all other European frameworks. Similar, it is mentioned in Austrian publication about more future-orientated developments such as about transformative learning in higher education (Geier et al., 2026) or another new Austrian competence framework for future literacy in higher education (Bierwitsch et al., 2026).

Entrepreneurship is a key priority for the Federal Ministry of Education, Science and Research, which promotes it through various initiatives developed in partnership with other governmental bodies and institutions (BMB, 2026h). As an interdisciplinary educational objective, entrepreneurship education components are embedded across the curriculum, appearing most frequently in subjects such as business administration, accounting, economics, project management, and related fields (BMB, 2026h). Amongst others, the Centre for Entrepreneurship Education and Values-Based Business Didactics (at Kirchliche

Pädagogische Hochschule Wien/Krems, KPH) hosts a dedicated Centre for Entrepreneurship Education and Values-Based Business Didactics which serves as a central hub for developing and disseminating entrepreneurship education in schools in Austria. It is important that entrepreneurship education is understood including societal innovation and values (see Lindner, 2015) and is seen as a relevant contribution for a sustainable future (Lindner, 2018). Notable examples of practical implementation include the *YouthStart Entrepreneurial Challenges*. Nevertheless, a master's thesis by Albers (2022) concludes that the *EntreComp* (2016) reference framework is only partially applied in extracurricular entrepreneurship education initiatives for lower secondary education in Austria, with implementation challenges outweighing practical benefits, suggesting that European reference frameworks primarily serve scientific and educational policy purposes rather than classroom practice, leading to specific recommendations for revising these frameworks to enhance their practical relevance in the Austrian context. A study by Pock et al. (2019) shows clear indications of entrepreneurial competencies to be taught across all education levels in Austria, but as well as that actual implementation in school practice falling significantly short of what curriculum guidelines suggest. To sum up, *EntreComp* is acknowledged and sort of integrated in Austrian entrepreneurship education (see Linder, 2018). Notably, a dedicated competence framework for teachers in entrepreneurship education was developed (BMB, 2026g).

As described in paragraph 1.3, artificial intelligence is an important focus of teaching in school and addressed in the Austrian *digi.kompP* framework (Brandhofer et al., 2026). Nevertheless, to our research, we could not find an explicit mentioning of the UNESCO (2024) *AI Competence Framework for Teachers* in publications (e.g. at BMB, 2026e; or with search for "AI Competence Framework for Teachers" “Austria”/”Österreich” at scholar.google.com, 24.3.2026).

Table 1 gives an overview of the adoption level of the mentioned, DigiSET related international competence frameworks in Austria.

Framework	Adoption Level	Notes
DigCompEdu (2017)	recommended	While *DigComp* and *DigCompEdu* are recognized as valuable references in Austria, the country has established its own binding national framework, *digi.kompP*, which serves as the primary standard for teacher professional development, includes e.g. OER, AI, inclusion and ESD and was updated in 2026.
GreenComp (2022)	recommended	*GreenComp* is named as source for the Austrian national competence framework (BMBWF, 2022); ESD is a criterion in the digi.kompP framework for teachers, which refers to the UN *Sustainabilty* Goals (UN, 2015)
LifeComp (2020)	recommended	Papers and policies refer to the framework.
EntreComp (2016)	recommended	*Entrepreurship* education papers and policies refer to the framework.
AI Competence Framework for Teachers (UNESCO, 2024)	not used	No reference found at ministry Webpage or publications, but a MOOC for teachers about AI and other refers to it (see chapter 5), it is not explicitly mentioned in the *digi.kompP* update (Brandhofer et al. 2026)

Table 1: Overview of adoption level of selected international competence frameworks in Austria

2.3 Gaps in current competence frameworks

Concerning a “Digitally Sustainable European Teacher”, the strongest emphasis in Austria seems to lie in technical and pedagogical digital literacy. The Austrian *digi.kompP* framework provides a detailed progression model covering digital identity, information literacy, and content creation, with Open Educational Resources (OER) explicitly integrated – and additionally, ESD (see 2.1). Sustainability competencies appear additionally well-documented through separate frameworks and the ÖKOLOG network and ministerial publications on ESD educator competencies.

The fact that European frameworks were not significantly adapted in Austria is likely due to the existence of well-established national concepts at the time of their introduction. This is particularly evident in the current *digi.kompP* framework, where several of DigiSET's core themes are already explicitly addressed.

From this perspective, we do not identify significant gaps at the conceptual level concerning a "Digitally Sustainable European Teacher”, even though there is no single, explicit framework that comprehensively unifies all aspects of digital teaching and sustainability detailing all DigiSET specific topics (such as gender bias in AI).

3. Initial Teacher Education (ITE) and Continuous Professional Development (CPD) and its Certification

3.1 Initial Teacher Education (ITE) provision

In this paragraph we will describe how sustainability education, digital pedagogy, AI in education, OER creation is addressed in Initial Teacher Education (ITE) but will start with a description of its organisation and providers.

3.1.1 Austria’s ITE organisation and providers

In Austria, initial teacher education for early childhood, primary, and secondary education is delivered through universities and University Colleges of Teacher Education (Pädagogische Hochschulen, PHs) following the 2013 reform of teacher training. These institutions cooperate within *four regional development alliances* to provide coordinated programmes across school levels.

For kindergarten teachers, prospective educators may train at specialized colleges for early childhood pedagogy (BAfEP) or within PHs. These programmes that are at EQF 4 combine subject-specific early childhood pedagogy, general education, and extensive practical training in kindergartens. Graduates are qualified to teach children from age three to six and are prepared to meet the pedagogical, social, and developmental needs of young learners. Bachelor programmes for early childhood education got in force very recently and offered at teacher education colleges (PHs) (EC Eurydice, 2025a).

For primary school teachers, training is provided primarily at PHs through Bachelor’s and Master’s programmes, which integrate academic study, pedagogical theory, and supervised practical placements in authentic classroom settings. Graduates are qualified to teach children from age six to ten. Bachelor’s degrees typically last eight semesters (240 ECTS), followed by two- to three-semester master’s degrees (60–90 ECTS) that deepen subject-specific and professional competences. Initial programmes also include a mandatory entry and orientation phase (StEOP), and newly qualified teachers participate in a mentoring-supported induction year during their first year of service (EC Eurydice, 2025a).

For secondary and vocational school teachers, training depends on the school type. Teachers for general academic secondary schools (AHS) complete joint university–PH

programmes that provide academic subject knowledge and pedagogical training for teaching adolescents up to age 19. Teachers for vocational secondary schools (BHS) complete PH-based vocational programmes focused on both subject-specific content and professional pedagogical skills. Like primary school programmes, these courses integrate practical teaching experience in authentic school settings (EC Eurydice, 2025a).

All initial teacher education programmes in Austria are publicly funded and tuition-free, and they combine academic study, pedagogical theory, and supervised practical placements to ensure that teachers are professionally prepared and experienced before entering service (EC Eurydice, 2025a).

3.1.2 The role of sustainability education, digital pedagogy, AI in education and OER creation in ITE

The integration of digitally sustainable teaching topics into Initial Teacher Education (ITE) in Austria appears to follow a differentiated pattern.

Education for Sustainable Development (ESD) seems to hold a formally established position. Sustainability must be addressed in curriculum revisions, though the extent of uniform integration across all ITE programmes appears variable.

Digital Pedagogy appears to be the most systematically addressed area. The *digi.kompP* framework seems embedded in teacher education curricula as a binding reference, providing a structured progression model covering technical knowledge, pedagogical application, and professional collaboration. And there is a mandatory school subject "Digitale Grundbildung" (Digital Basic Education).

AI in Education seems increasingly addressed, though integration depth appears variable. While AI is referenced in the *digi.kompP* framework and school curricula, systematic embedding in ITE programmes is still be developing. For all new curricula for teacher training in Austria, AI is a mandatory core topic (beside e.g. diversity and inclusion) requested by the Austrian Quality Assurance Council (QSR, 2024).

OER Creation seems to occupy an intermediate position. The *digi.kompP* framework explicitly references OER in Category C ("Creating Digital Materials"), yet the use of open licenses is not compulsory, and OER-specific training availability within ITE is not regularly installed. At Graz University of Technology, an optional lecture “Open Educational Resources” for future teacher in informatics exist e.g. since 2024 (Ebner et al., 2026, p. 8).

Table 2 gives an overview of the adoption level of digitally sustainable teaching topics in ITE in Austria.

Aspect	Adoption Level	Notes
Education for Sustainable Development	mandatory	Required in curriculum revisions; integration varies
Digital Pedagogy	mandatory	See the *digi.kompP* serving as a base for curricula development and school development
AI in education	mandatory	For future curricula development, the Austrian Quality Assurance Council requests artificial intelligence as one of 3 central topics in all curricula; AI is referenced in the *digi.kompP* framework
OER creation	optionally	Referenced in *digi.kompP*; not compulsory

Table 2: Overview of adoption level of digitally sustainable teaching topics in initial teacher education in Austria.

3.2 Continuous Professional Development (CPD) opportunities

In this part, we again first introduce the organisation and providers of CPD in Austria, and then describe how sustainability education, digital pedagogy, AI in education, OER creation is addressed in CPD.

3.2.1 Austria's CPD organisation and providers

Continuous professional development for in-service teachers in Austria is mostly provided by University Colleges of Teacher Education (PHs), partly in collaboration with universities (Müller et al., 2018, p. 105. Information on offers and possibility to register is provided at the national "PH online" system. This includes structured (online) courses, seminars, and certifications to update pedagogical skills, incorporate new subject knowledge, and respond to emerging educational priorities such as digital literacy, inclusion, or curriculum reform. (EC Eurydice, 2025b). The Virtuelle PH ('virtual PH') constitutes an exclusively online professional development platform for teachers, primarily—but not exclusively—focused on digital teaching (see 5.1).

Regarding the types of offerings, a distinction can be made between nationwide and regional programs, school-based teacher training (called SCHILF), multi-school initiatives (called SCHÜLF, and structured university courses (certificate program) (Müller et al., 2018b, p. 146). While many school-based initiatives and union offerings are free of charge, formal postgraduate courses at University Colleges of Teacher Education and universities usually involve fees. However, these costs are typically covered by the employer (the state) if the training is deemed necessary for professional duties or career advancement.

While continuing professional development is not mandatory for all teachers to retain their positions, it is essential for career advancement (e.g., salary grade promotion) and acquiring specific qualifications. Training activities should be scheduled during designated non-teaching periods or as part of school-based initiatives, but this is only partly the case (Müller et al., 2018a, p. 131). Relevant courses are registered in the central PH Online system (see Müller et al., 2018a, p. 111); while University Colleges of Teacher Education (PHs) are the primary administrators, accredited courses from universities and other recognized providers such as University for Continuing Education Krems are also included.

3.2.2 The role of sustainability education, digital pedagogy, AI in education and OER creation in CPD

Continuous professional development for in-service teachers in Austria is coordinated through University Colleges of Teacher Education (PHs) and universities, with information provided via the national "PH online" system.

Digital Pedagogy is well-supported through structured courses and seminars. The *digi.kompP* framework serves as a reference, and the Virtual PH offers various online modules. The national *AI MOOC* and *eEducation* network initiatives appear to provide targeted support for emerging digital competencies.

AI in Education seems to have growing CPD offerings. Resources include the national AI MOOC, seminars, and webinars covering AI basics, classroom use, ethics, and data protection (BMB, 2026e). Pilot projects and good practice collections appear to support practical implementation (see chapter 5). AI upskilling opportunities are partly financed through temporary projects, so they are only available for a few sessions before ending, for example the offers by the EDLRIS project (Kandlhofer et al., 2023).

Based on our research, there are currently at least four specialized master's programs or postgraduate courses offered by Austrian Universities of Teacher Education and others that focus on Artificial Intelligence for teaching:

- The master's program "Artificial Intelligence and School Education" (6 ECTS, 2 semesters) at the PH Lower Austria (PH Niederösterreich, 2024), with the first cohort launching in Autumn 2024.
- The online postgraduate course "Artificial Intelligence in IT Teaching for Vocational Education" (6 ECTS, 1 semester) jointly offered by the PH Tyrol and the University of Agriculture and Environmental Pedagogy (HAUP, 2026), commencing in Spring 2026.
- The postgraduate course "Generative Artificial Intelligence in Schools and Teaching" (6 ECTS, 2 semesters) at the KPH Wien/Niederösterreich (2026), scheduled to start in Autumn 2026.
- Lastly, CONEDU together with Universität für Weiterbildung Krems (2026) announced a certificate program addressing teachers in higher education (12 ECTS, 1 semester) to be starting in autumn 2026.

Education for Sustainable Development and related CPD offers are available through platforms like *Bildung2030* and the ÖKOLOG network. The Pädagogische Hochschule Burgenland serves as a "national centre" for ESD (Burgenland.at, 2026) and offers e.g. courses and training on how to teach in nature (PPH Burgenland, 2026).

OER Creation is addressed in trainings in CPD, but the Austrian OER certification scheme targets higher education institutions primarily, with limited evidence of widespread school-teacher uptake.

Table 3 gives an overview of the adoption level of Digitally Sustainable Teaching topics in Austrian CPD.

Aspect	Adoption Level	Notes
Education for Sustainable Development	optionally	*Bildung2030*, Ökologie, ESD certificate exists, but limited uptake
Digital Pedagogy	mandatory	Widely available
AI in education	optionally	References in the *digi.kompP* framework, MOOCs, seminars, webinars, pilot projects support implementation
OER creation	optionally	References in the *digi.kompP* framework, OER certification mainly for higher education

Table 3: Overview of Adoption Level of Digitally Sustainable Teaching Topics in Continuous Professional Development in Austria.

3.3 Certification and recognition

Austria's teacher training system, established by a 2013 federal decree, aligns with the Bologna architecture, requiring candidates to pass an aptitude test before enrolment. Programs now include an initial orientation phase and combine theoretical coursework with practical teaching internships supported by pedagogical seminars. Recent reforms (effective 2025 for primary, 2026 for secondary) streamlined the structure to 180 ECTS for the bachelor and 120 ECTS for the master. While the bachelor confers initial professional qualification, a master's degree is mandatory for permanent employment. New teachers also complete a mentored induction year upon entering the workforce (Hofmann, Hagenauer & Martinek, 2026).

Crucially, all examinations and academic transcripts within these programs adhere strictly to standard higher education regulations, ensuring they meet the same legal and quality assurance frameworks as other university degrees in Austria.

A detailed overview of the specific degrees or certificates awarded in teacher professional development (see 3.2) could not be identified for this report. Notably, the National Education Report, despite its extensive description of teacher training (Müller et al., 2018a), makes no mention on specific qualifications and certificates.

3.4 Gaps in current ITE/CDP

The analysis of training provision reveals a distinct asymmetry between well-resourced areas and those receiving limited systematic support. The most robust support appears in *foundational digital pedagogy*. ITE programmes seem to systematically embed *digi.kompP*-aligned modules, and CPD offers a wide array of courses through the PH online system. The national *AI MOOC* and *eEducation* network initiatives suggest growing infrastructure for AI-related training.

At the provision level, several gaps emerge:

1. *Fragmented ESD Training Delivery*: While ESD is formally required in curricula, actual training opportunities seem unevenly distributed. The BNE course at the University of Klagenfurt demonstrates institutional commitment but appears selective rather than systemic (Rauch & Pfaffenwimmer, 2020). CPD offerings via Bildung2030 (2026) exist, yet their reach and uptake among schoolteachers remain unclear.
2. *Limited Practical OER Training:* Although OER is referenced in *digi.kompP*, hands-on training on creating, adapting, and licensing open materials does not appear to be systematically offered. The Austrian OER certification scheme primarily targets higher education, leaving school teachers with limited structured pathways.
3. *Accessibility of Advanced AI Ethics Training:* While basic AI literacy courses exist, specialized training on algorithmic bias, gender-unbiased AI, or critical AI ethics appears to be currently offered through supplementary seminars rather than as guaranteed components of ITE or mandatory CPD.
4. *Missing Interdisciplinary Training Formats:* Training programmes seem to operate mostly separately so far: digital pedagogy courses seem to rarely integrate sustainability perspectives, and ESD courses rarely address digital tools. It should also be noted that the *digi.kompP* model provides for corresponding possibilities, and that this report likewise outlines examples of mutual adoption of themes across the frameworks in 1.5. Opportunities for teachers to develop competencies at the intersection of these domains appear, nevertheless, scarce.

Two structural factors may contribute to these gaps: First, the absence of a binding "sustainable digital literacy" concept means no clear mandate exists for integrated training. Second, the voluntary nature of many CPD offerings (e.g., OER, advanced AI ethics) places the burden of initiative on individual teachers rather than institutions.

To sum up, foundational digital skills are well-supported, the practical development of integrated competencies for a Digitally Sustainable European Teacher seems hindered by fragmented provision, limited accessibility of specialized training, and the lack of interdisciplinary course formats.

4. Analysis of the Four DigiSET Thematic Areas

4.1 Gender-unbiased AI in teaching

Austria's approach to gender equality in education rests on a comprehensive constitutional, institutional, and European policy framework. The principle of equality, enshrined in the Federal Constitutional Act (Bundes-Verfassungsgesetz), provides the normative foundation for equal opportunities across all sectors (Bundesgesetzblatt, 1945). Since the 1998 amendment, public authorities have been mandated to implement gender mainstreaming, further reinforced through gender budgeting and performance-based governance introduced in 2013. These instruments require federal ministries to define outcome-oriented objectives, including gender equality targets, supported by gender-disaggregated data from Statistics Austria to monitor participation, attainment, and field-of-study choices.

Despite this framework, structural gender inequalities persist (Federal Ministry Women, Science and Research Republic of Austria, 2025). While women now outperform men in tertiary attainment (EIGE, 2025), horizontal segregation remains pronounced, particularly in STEM fields. As AI systems are integrated into teaching, learning, and assessment, these pre-existing inequalities risk being reproduced or amplified through algorithmic bias.

At the school level, Austria's 2018 ministerial circular on *Reflective Gender Education and Equality* [*Reflexive Geschlechterpädagogik und Gleichstellung*] serves as the primary policy anchor for addressing bias, stereotypes, and equitable representation in classroom materials and pedagogy (BMBWF, 2018). The eEducation Austria resource area on *Gender Equality and Schools* [*Gleichstellung und Schule]* translates this into practice, recommending the review of teaching materials for stereotypes, use of inclusive language, and embedding of gender topics in teacher professional development for digital education (eEducation Austria, 2026). Austria's *Digital Decade Roadmap* further signals structural attention to gender in the digital transition, including measures to dismantle stereotypes in educational and career choices and strengthen gender equality in research and development (Federal Chancellery Republic of Austria, 2025).

At the European level, Austria's policies align with the European Education Area, where gender equality is a cross-cutting priority. Working groups have focused on gender concepts and stereotypes in education, while projects such as CYBERSAFE — *Changing Attitudes among Teenagers on Cyber Violence against Women and Girls* — provide pedagogical toolkits addressing gender-based online risks and building critical digital literacy (International Child Development Initiatives, 2021). National programmes including the *STEM-Girls Challenge* and *Let's Empower Austria* (LEA), alongside European initiatives such as GEM — *Empower Girls to Embrace their Digital and Entrepreneurial Potential* — and the InvestEU Programme, seek to increase female participation in STEM and digital fields (Federal Chancellery Republic of Austria, 2025). These efforts are complemented by the 2023 Council Recommendation on digital skills, which explicitly links digital competence development with gender equality objectives.

The Artificial Intelligence Act, in force since August 2024, establishes a risk-based regulatory framework requiring high-risk AI systems used in education to meet strict standards on data quality, transparency, and accountability (European Commission, 2024). In Austria, implementation has been underway since February 2025. The Equal Treatment Ombudsman [Gleichbehandlungsanwaltschaft] addresses algorithmic discrimination, the national AI strategy *AIM AT 2030* promotes a human-centric approach grounded in fundamental rights, and civil society actors such as Women in AI Austria advocate for diversity in AI development. At the teacher training level, existing offerings such as the KI MOOC include content on AI ethics but do not yet explicitly address gender bias (BMB, 2026e).

When examined through the lens of gender-sensitive AI pedagogy, however, important gaps remain. National and European attention to gender bias in AI is largely embedded within

broader digitalisation and equality frameworks rather than articulated as a distinct educational priority. Explicit materials addressing algorithmic bias, AI ethics, and gender representation in AI systems remain limited, and the integration of a gender perspective into AI-focused teacher training is not yet systematic. This reflects the wider underrepresentation of women in STEM and AI fields, which shapes both workforce diversity and the epistemic foundations of educational AI systems.

Austria thus offers a promising foundation, a well-established gender equality framework combined with a growing AI teacher-training environment, but the intersection of the two remains partial and fragmented. For initiatives such as DigiSET, this points to a clear opportunity to develop an explicit competence area focused on: identifying algorithmic and representational bias in AI outputs; reviewing OER for gender stereotypes; designing gender-inclusive prompts, examples, and datasets; and critically examining who builds AI systems and whose perspectives are represented within them.

4.2 Systems thinking for sustainability in education

The Austrian ministry's page on Educational Sustainable Development (ESD) explicitly states that it aims to develop critical reflection, systems thinking, and future-oriented thinking and stresses the need to think together across ecological, economic, and social dimensions through cross-curricular links (BMB, 2026c). That is a direct policy-level confirmation that systems thinking is already embedded in Austrian ESD discourse. Generally (see chapter 3) teachers in Austria can access a broad range of continuing professional development opportunities guided by the competency framework and offered through established initiatives like BNE (Rauch & Pfaffenwimmer, 2020) to specifically strengthen their skills in ESD.

Austria also has longstanding national infrastructures for ESD, especially the ÖKOLOG network and related ministry-backed materials. The updated *Skills Compass* [*Kompetenzen-Kompass]* for teachers in environmental education/ESD and the new *digi.KompP* framework shows that Austria treats ESD not only as a topic, but as a professional field requiring teacher competences, continuing education, and orientation frameworks for providers of teacher training.

For DigiSET, the Austrian context supports OER development that asks teachers to:

- connect environmental, economic, and social dimensions,
- use interdisciplinary case work,
- integrate futures thinking and critical reflection,
- and design learning tasks around complex systems rather than isolated facts.

4.3 AI for adaptive learning

Austria's national AI strategy explicitly recognises AI in education as a field with potential for personal and individualised support across all educational levels. The strategy's annex identifies four relevant categories (BMK & BMDW, 2021, p. 22): smart content, intelligent tutoring systems, virtual learning companions/chatbots, learning analytics / predictive analytics. So, this strategy describes intelligent tutoring systems as providing personalised learning materials and real-time feedback matched to different learning styles and needs, based on learning analytics and patterns from comparable learners. It also stresses that AI in education should be used responsibly and pedagogically/didactically meaningfully, with critical reflection on implications such as data protection and with accompanying research on effectiveness. At school-system level, Austria's digital-education infrastructure also supports personalisation. The OeAD information on digital devices notes that some learning platforms

enable teachers to define individual tasks and performance goals and to keep track of learning progress more easily (OEAD Digitales Lernen, 2026).

At the same time, recent parliamentary discussions in Austria show that schools need to adapt teaching and assessment practices due to the increasing use of AI tools such as ChatGPT. These discussions emphasise a shift away from traditional, standardised exams towards more continuous and development-oriented forms of assessment (Parlament Österreich, 2023). This change supports the idea of adaptive learning, as it focuses more on individual learning progress rather than one-time performance measurement.

However, adaptive testing and fully data-driven assessment systems are not yet widely implemented in Austria. While AI-based tools are being introduced in teaching and learning contexts, their use for assessment remains limited. International evidence suggests that only a small proportion of teachers currently use digital technologies for student assessment, indicating that adaptive testing is still in an early stage of development (OECD, 2025).

Teacher training plays a key role in the implementation of AI-supported adaptive learning. In Austria, AI is increasingly included in teacher education and professional development programmes. National initiatives provide training opportunities such as seminars, MOOCs, and pilot projects that aim to improve teachers' digital and AI-related competences (BMB, 2026e). In addition, new teacher education curricula are required to include AI as a core topic, reflecting its growing importance in education policy (QSR, 2024).

Despite these efforts, significant challenges remain. Many teachers report that they do not feel sufficiently prepared to use AI effectively in their teaching practice (OECD, 2025). This highlights a gap between policy ambitions and actual classroom implementation. In particular, there is a need for more practical training that helps teachers integrate AI into teaching, assessment, and personalised learning scenarios.

Austria's policy approach to AI in education can be described as practice-oriented and evolving. Instead of a fully standardised national system, the country focuses on pilot projects, digital learning platforms, and the gradual integration of AI into existing educational structures (BMB, 2026e). These initiatives support experimentation with AI tools and provide important insights into their pedagogical use. At the same time, both policy documents and parliamentary proposals highlight important risks. AI systems may produce incorrect information, reflect bias from training data, and create new inequalities if access to technology is not equally distributed (Parlament Österreich, 2023). Therefore, the use of AI in adaptive learning must be accompanied by strong ethical guidelines, data protection measures, and critical reflection on its impact on learners.

Overall, Austria provides a solid foundation for AI-supported adaptive learning through its national strategies, teacher training initiatives, and ongoing pilot projects. However, adaptive testing and fully personalised learning systems are still under development. Future progress will depend on strengthening teacher competences, expanding practical implementation, and ensuring that AI is used in a responsible and inclusive way. Thus, it can be summed up that Austria is not yet a country with a mature, nationwide adaptive-learning ecosystem but it gives DigiSET a solid entry point concerning AI for adaptive learning.

4.4 Inclusive teaching practices and learning difficulties

Inclusive teaching is a comparatively strong area in Austria. Inclusive education is institutionally anchored in both policy and teacher education. The ministry states that students with special education needs ("sonderpädagogischer Förderbedarf", SPF) may be taught either in special schools or inclusive mainstream settings, and that inclusive teaching is guided by quality standards. It also notes that qualified teachers are responsible for this individualised support (BMB, 2026i). Teacher education curricula reflect this directly. For example, the curriculum for the "Spezialisierung Inklusive Pädagogik" (Specialization in

Inclusive Education) (Pädagogische Hochschule Wien, 2026) in the Nord-Ost teacher education cluster defines inclusion as a dynamic process aimed at enabling high-quality education and equal participation, reducing barriers, and supporting learners with disabilities, learning difficulties, and social-emotional challenges. It also explicitly mentions the use of digital technologies to create accessible educational offers and enable participation for all learners. Similarly, the digital-devices initiative (OEAD Digitales Lernen) also explicitly frames digital work as enabling more inclusion, for example through different display options for visually impaired learners and digitally supported listening/speaking exercises for learners with mobility impairments. Accessibility and inclusion are criteria in the *digi.kompP* framework as well (see 2.1).

Austria has a strong base here that is a clear teacher-education anchoring, policy recognition of inclusive mainstream education, concrete digital-inclusion projects and tools, and innovation activity related to learning difficulties. The main challenge is not absence of policy, but uneven implementation and the need for more systematic digital-inclusion competence among teachers.

5. Innovative practices and case studies

5.1 Case Study 1: Virtual University of Teacher Education (Virtuelle PH)

Organisation/Project	Virtuelle PH (Austria)
Main Dimensions Addressed	The platform offers virtual modules covering digital pedagogy and didactics, emerging technologies such as AI, and general professional development.
Teacher Competences Developed	Teachers develop competences in: + Digital Content Creation & Curation + Facilitating Digital Learning + Professional Engagement & Collaboration + Adaptive & Inclusive Teaching Strategies
Learning Approach	Offerings are delivered in flexible online formats, including short online seminars, self-paced MOOCs exclusive to Austrian teachers, and virtual conferences and webinars.
Transferability to DigiSET	The modular structure and focus on specific domains (AI, inclusion) align well with DigiSET's goal of integrated digital-sustainable competencies. The exclusive access ensures high relevance for the national target group.

The Virtual University of Teacher Education (Virtuelle PH) operates as a central service facility mandated by the Federal Ministry of Education to promote and impart digital competencies among educators across all Austrian teacher training colleges (Pädagogische Hochschulen) and schools. It serves as the central national network and is organizationally affiliated with the Private University of Teacher Education of Burgenland. Its digital offerings, accessible exclusively online via its website, encompass a broad spectrum of professional development formats. These extend beyond strictly digital pedagogy to include diverse thematic areas, such as special needs education (e.g., autism) and diabetes. The portfolio ranges from short online seminars (see Figure 5) and virtual conferences to self-paced Massive Open Online Courses (MOOCs), including specialized modules on emerging technologies like Artificial Intelligence. The access to these MOOCs (although named

"open") and other offers is restricted exclusively to teaching professionals within Austria and is not open to the general public.

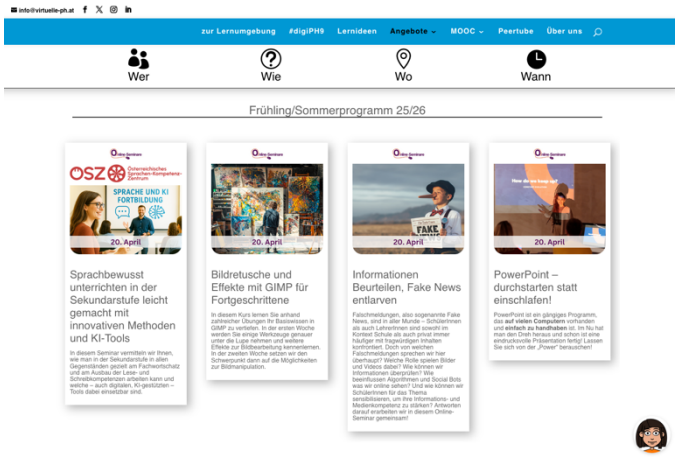

Figure 5: Screenshot of virtuelle PH offers as online seminars on (from left to right) language learning with AI, using GIMP, fake news detection, Powerpoint presentation. Source: https://www.virtuelle-ph.at/online-seminar-redesign/ (2026-04-27)

5.2 Case Study 2: Prompting.school

Organisation/Project	Prompting.schule | Prompting.school (TU Graz, Benedikt Brünner)
Main Dimensions Addressed	AI literacy, digital pedagogy, and practice-oriented teacher training, with a focus on the responsible use of generative AI available as OER.
Teacher Competences Developed	Teachers develop competences in: + prompt engineering and effective AI use + critical evaluation of AI outputs (bias, limitations) + integrating AI into teaching practice + reflecting on ethical and pedagogical implications
Learning Approach	Training is delivered via a self-paced, interactive platform with guided exercises, real-time AI feedback, and hands-on experimentation.
Transferability to DigiSET	The platform was developed using a design-based research approach in close collaboration with teachers (Pädagogische Hochschule Steiermark, 2025). Pre-service and in-service teachers were actively involved in iterative testing and feedback cycles, ensuring strong alignment with classroom needs. The case highlights the importance of: + co-creation with teachers for relevance and acceptance + hands-on, practice-based learning for AI competences + iterative development based on real classroom feedback

The *prompting.school* is an OER initiative to develop AI competencies in education by providing structured, practical learning opportunities (Brünner et al., n.d.; see Figure 6). On this platform, offered in German and in English, formats have been developed for different target groups. For teachers, the platform offers introductory courses in the core concepts of generative AI and prompt engineering. These courses focus on building basic competencies, enabling teachers to understand, critically reflect on and apply AI tools in their professional practice. Furthermore, more specialised learning opportunities have been developed, including courses designed specifically for students. These courses aim to foster early AI literacy and encourage learners to become critical and competent users of generative AI technologies. The platform is aligned with the UNESCO AI Competency Framework for Teacher (UNESCO, 2024a) and Students (UNESCO, 2024b). Using open badges, the

platform can be easily integrated into everyday school practice. Teachers can use the courses flexibly within their teaching routines, for example as part of lesson preparation, homework, or blended learning scenarios.

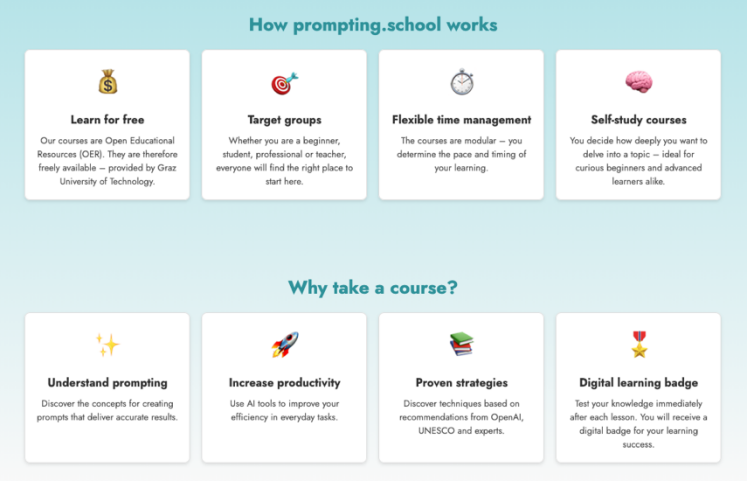

Figure 6: Screenshot of prompting.school starting page. Source: https://prompting.school/en (2026-04-15)

5.3 Case Study 3: A MOOC for teacher training on generative Artificial Intelligence as OER

Organisation/Project	IMooX.at (University of Graz, TU Graz) – MOOC "Generative KI: verstehen, gestalten, verantworten" https://imoox.at/course/genki
Main Dimensions Addressed	AI literacy, digital pedagogy, ethics, and societal implications of AI, with a focus on responsible and reflective use of generative AI
Teacher Competences Developed	Teachers develop competences in: + understanding how generative AI works + applying AI in teaching and learning contexts + reflecting on ethical, legal, and societal implications + supporting creativity and self-regulated learning with AI
Learning Approach	The MOOC follows a self-paced online learning approach with structured modules, videos, interactive elements, quizzes, and discussion forums. It combines theoretical input with practical examples and includes both mandatory and optional modules for deeper exploration.
Transferability to DigiSET	The MOOC highlights: + the potential of scalable, open online courses for teacher training + the importance of combining AI basics, pedagogy, and ethics + the value of flexible, modular learning formats It demonstrates how AI competences can be developed at scale through OER-based digital learning environments.

The MOOC was developed within the PeBiWi research project (Otrel-Cass et al., 2025) and provides structured learning on generative AI through four core modules (foundations, creativity, society, and ethics), complemented by optional modules such as teaching with AI (see Figure 7). It is openly accessible via Austria's National MOOC platform iMooX.at and offers certification upon completion. The MOOC integrates in the first lecture an interactive, reactive video pathway, which allows learners to actively engage with the content by making decisions that influence the learning trajectory. This approach is based on the concept of an interactive scripted learning workshop design as described by Brünner, Schön & Ebner (2025), where learners are guided through structured prompts, reflection phases, and contextualized AI examples.

The reactive video path translates the design-based research-based workshop approach into an asynchronous format. The learners to experience key AI concepts, such as probabilistic reasoning, context dependency, and prompt manipulation, in a guided, exploratory way. This supports active participation and “eureka moments”, rather than passive content consumption.

In lesson 5, “Teaching with genAI”, the MOOC focuses on pedagogical use of generative AI in educational practice. The lesson draws on interviews with teachers, higher education didactics experts, and representatives from the e-learning sector to discuss concrete experiences, challenges, and opportunities related to the use of generative AI in teaching. Attention is given to differentiation, creativity, individual learning pathways, critical thinking, media literacy, legal uncertainty, and the changing role of teachers as facilitators of learning processes. The lesson also explicitly refers to the UNESCO AI Competency Frameworks for Teachers and Students and highlights that meaningful AI integration requires not only technical knowledge, but also ethical reflection, didactic planning, and continuous professional development.

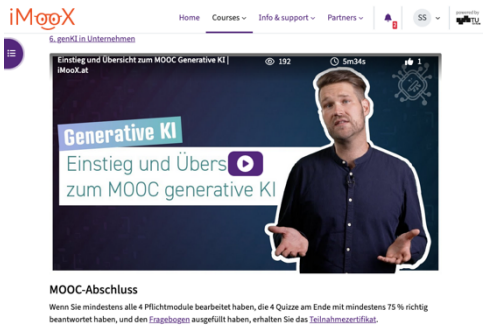

Figure 7: Screenshot of the introductory part of the MOOC Generative AI at iMooX.at. Source: https://imoox.at/mooc/course/section.php?id=6376&lang=en (2026-04-15)

6. Conclusions and Implications

6.1 Competence Implications for the Digitally Sustainable Teacher

6.1.1 Emerging Competence Areas

Concerning the “Digitally Sustainable Teacher”, based on the Austrian context, several competence areas appear increasingly relevant for teachers:

- **Critical AI Literacy**: Teachers seem to need competencies beyond basic AI usage, including understanding algorithmic bias, ethical implications, and environmental costs of AI systems. Evidence from recent policy initiatives (AI MOOC, Prompting.School) suggests growing recognition of this need and is one of the latest revisions in the Austrian competence framework for digital teaching (Brandhofer et al., 2026, see 2.1).
- **Interdisciplinary Integration:** The ability to connect digital tools with sustainability goals appears essential. Also, the formal requirement to integrate ESD, AI and Digital Teaching (and more) into all curricula suggests this direction. It is addressed in the *digi.kompP* framework, and we could find examples (1.5). Nevertheless, there seems currently not yet a systematically implementation.
- **OER Creation and Curation:** Given the explicit reference in *digi.kompP*, teachers appear to need practical skills in creating, adapting, and licensing open educational resources, but the current implementation in initial teacher education seems not well established.

6.1.2 Underdeveloped Competences

Several areas seem insufficiently addressed in Austria, although addressed in the *digi.kompP* framework.

- **Systems Thinking for Digital Sustainability:** Despite the theory and the frameworks, connecting digital infrastructure to ecological footprints appears largely absent from both ITE and CPD.
- **Environmental Impact Assessment:** Competencies for evaluating the sustainability of digital technologies (energy consumption, e-waste) are addressed in the *digi.KompP* 2026 framework, but strong implications for teacher training are currently not seen.
- **Inclusive and gender-sensitive applications in digital practices:** Even though several policy and frameworks exist on these issues, a holistic approach is missing.

6.2 Recommendations and Implications for DigiSET Framework Development

6.2.1 Implications for the Competence Framework

The DigiSET framework should appear to address:

- **Holistic Integration**: Rather than treating digital and sustainability competencies separately, the framework seems to benefit from explicit intersection points (e.g., "using digital tools for sustainability goals").
- **AI Ethics as Core Component:** Given the rapid development of AI in Austrian education, ethical competencies should appear in the DigiSET framework as mandatory rather than supplementary.
- **Practical Application Focus:** The framework should emphasize – as in the Austrian *digi.kompP* framework – actionable competencies (creating OER, assessing AI bias) rather than abstract knowledge.

6.2.2 Implications for Learning Outcomes

Teachers should be able to demonstrate:

- **Design learning activities** using AI responsibly while considering inclusivity, gender-sensitive and ethical and environmental implications
- **Integrate sustainability concepts** across subjects using digital tools
- **Create and share OER collaboratively** with appropriate open licensing, preventing gender bias and ensuring inclusion.
- **Evaluate the environmental impact** of digital technologies used in teaching

6.2.3 Implications for Training Design

Training approaches seem to require:

- **Practice-Based Learning**: Hands-on OER creation and AI tool experimentation appears more effective than theoretical instruction alone.
- **Interdisciplinary Workshops**: Combining digital pedagogy with sustainability perspectives in single sessions may help bridge current silos.
- **Reflective Components**: Critical reflection on technology choices and their broader impacts seems essential for sustainable digital literacy.

6.3 Potential for National Integration

The DigiSET training programme appears to have moderate integration potential in Austria:

Enablers:

- Existing infrastructure (virtual PH, eEducation) seems capable of hosting online materials and modules
- *digi.kompP* framework provides a reference point for alignment
- Strong digital pedagogy foundation and sustainability programs offers a starting point for expansion

Barriers:

- Lack of explicit "sustainable digital literacy" mandate may limit institutional uptake
- Digitally Sustainable Teaching requires fitting infrastructures and institutional support
- Fragmented European framework adoption suggests coordination challenges
- Implementation of DigiSET offers into teacher training or further education needs time (registration at PH online system)

Recommendation

The DigiSET framework could appear to align with *digi.kompP* while adding sustainability dimensions, potentially serving as a bridge between existing digital and ESD initiatives.

6.4 Key Findings Summary

Austria appears to possess strong foundational frameworks for digital education (*digi.kompP*) and sustainability (*ÖKOLOG*), yet these domains seem to operate largely in parallel. The primary gap is not a lack of individual competencies but the absence of an integrated approach that positions digital transformation as a lever for sustainability.

Key Drivers are government digitalization priorities, EU framework alignment, and established ESD networks appear to shape teacher competencies.

Main competence needs are interdisciplinary integration and practical OER and AI skills seem most pressing.

Gaps are seen in fragmented implementation, missing "sustainable digital literacy" concept, and limited systems thinking for digital sustainability appear as critical challenges.

This implies that the future DigiSET framework should appear to bridge existing silos by articulating explicit intersections between digital and sustainability competencies, with emphasis on practical application and ethical reflection.

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